

REVIEW

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Influence of board mechanisms on sustainability performance for listed firms in Sub-Saharan Africa

Peter Kwarteng^{1*} , Kingsley Opoku Appiah² and Bismark Addai³

Abstract

This study aims to examine the effects of board mechanisms (board size, board independence, board gender, board educational background, board tenure, foreign directors on board, board leadership–CEO duality, board sub-committees, frequency of board meetings and CEO power) on the sustainability performance (SP) of listed Sub-Saharan Africa (SSA) firms during 2010–2019. The study employed a two-step system generalized method of moments (GMM) estimation technique to test the hypothesised relationships among the variables. The results indicate that a positive and significant relationship exists between board tenure and environmental and economic SP. Board size and frequency of board meetings are positively linked with environmental and social SP. Additionally, the number of board sub-committees is positively correlated with social and economic SP. However, the board of directors' educational background is negatively associated with both social and economic SP. Diversely, board independence, educational background, and frequency of board meetings displayed a positive connection with the combined SP. These results suggest that board mechanisms have a significant influence on sustainability performance. Our findings offer useful insights for companies, regulatory bodies, and varied stakeholder groups in SSA countries to promote the connection between board mechanisms and SP beyond the present frontiers because it suggests thinking around specific board mechanisms that meet the demand for greater accountability for sustainability performance.

Keywords Board mechanisms, Sustainability performance, Sub-Saharan Africa, Triple bottom line, Corporate governance

Introduction

During these recent decades, the issue of sustainability performance (SP) has become progressively important globally, as climate and societal changes impact adversely on companies' operational activities, [39]. The SP concept echoes the impact of the activities of the company on

economic, social, and environmental responsibilities [8]. Against this backdrop, worldwide countries have seen the need to enact laws in the campaign toward cleaner production practices, especially in developing economies that are faced with issues of both environmental challenges and resource constraints [159]. For this reason, a new global target on sustainability is being set by Sustainable Development Goals (SDGs), by which corporates are likely to play a significant role through sustainable practices [104]. The goals comprise, among others, Zero Hunger, No Poverty, Quality Education, Gender Equality, Affordable Energy, Clean Water and Climate Action. The aim of the SDGs is to bring an end to poverty and guard the planet so as to guarantee

*Correspondence:

Peter Kwarteng
kwartengpeter2006@yahoo.com

¹ Department of Secretaryship and Management Studies, Sunyani Technical University, Sunyani, Ghana

² Department of Accounting and Finance, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

³ Kumasi, Ghana



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prosperity by 2030 [140]. Moreover, attaining these goals requires commitment from corporate bodies [141], because in carrying out their corporate responsibilities, all companies are required by their stakeholders to tackle the evils of global warming and human rights [4, 6, 134], and to report on their non-financial activities [143], as such reporting is aimed to elevate sustainability performance practices to match that of financial reporting [153]. It is argued that sustainability performance remains an emerging concern for all nations, since the degree of harm caused by corporate activities globally, has surpassed the usual ability to repair [5, 140].

To promote the adoption of SDGs and, thus, the implementation of sustainability performance, the literature suggests that companies need to strengthen their internal board mechanisms and structures (García Martín & Herrero, [51], Nguyen et al., [107]). This is because, firms' sustainability performance is influenced by their governance structures, systems and processes [66, 104]. In that regard, corporate boards are positioned as the main mechanisms that may ensure that corporate institutions can deliver sustainable progress, particularly considering the inefficiency of corporate governance structures among most firms in developing countries [147]. For instance, prior studies have revealed that unsustainable CG practices exhibited by boards of companies like Enron and Steinhoff have led to disastrous ripple effects on the investors at large ([100, 127], Sahabuddin & Hadianto [128]). Despite the importance of board mechanisms in promoting commitment to sustainable corporate activities [66, 104], there is a lack of empirical answers to the question of how successfully corporates are governed. Thus, how diverse internal board mechanisms can influence the determination of corporate social, environmental and economic performances [66] is not fully investigated. This implies that the amount of detail required by corporate boards to include these Triple Bottom dimensions of sustainability performance in their performance reports on corporate activities is limited [48, 151].

Theoretically, the key responsibility of the board of directors is to ensure that the company demonstrates sustainable performance to its stakeholders ([66, 93], Nguyen et al., [106]). However, existing literature identifies persistent and/or significant disconnections between board mechanisms and the three dimensions of sustainability performance [66, 104]. Prior studies have made some attempts to understand the association between corporate governance and financial performance (Jo & Harjoto. [74], Wahba [148]; [19, 77, 119]). In spite of this, the empirical contributions to consider the influence of specific corporate board mechanisms on all

three sustainability performance dimensions are scant. The aforesaid lacuna, therefore, serves as a motivation, as well as a profound opportunity for making novel contributions to the existing literature in the context of emerging economies of Sub-Saharan Africa, where sustainability matters are limited.

The African continent has been measured as the most populated region after Asia and has also been considered the most susceptible to the consequences of worldwide environmental and social problems such as climate change, deforestation, pollution, unemployment, poverty and concerns around access to clean water [34, 104]. It has been recognised that these issues are of great importance, particularly for the approximately 80% of the world's population living in developing economies, such as those in Sub-Saharan Africa [141]. For instance, according to Asongu et al., [14], the impact of greenhouse gas emissions in SSA has been most nefarious, while emissions of carbon dioxide (CO₂) account for close to three-quarters of the worldwide greenhouse gas emissions Asongu et al., [15]. Further, according to Jarrett [70], the main impediment to sustainable business in SSA is the lack of power supply. The author contends that the blackouts, experienced by 30 countries in the African continent, account for the annual loss in gross domestic product (GDP) between 2 and 5%. In that sense, we argue that this energy deficiency across the SSA countries also can further aggravate social consequences such as job creation, education, healthcare and poverty. For example, it is evidenced by 2019 data that only 18.8% of women in SSA (compared to the global average of 54.6%) were salaried or wage workers (World Bank, [155]). These perspectives affirm the general consensus among civil society organisations and academics that SSA lags behind other regions of the world in terms of achieving SDGs in 2030, which implies that multiple development priorities must be undertaken across the continent to ensure sustainable environmental and social governance [75]. Accordingly, the revision of corporate governance codes of some SSA countries namely, Ghana (2010), South Africa (2010), Nigeria (2011) and Kenya (2014) was a step in the right direction to incorporate the expectations that corporate managers must engage in sustainable business practices such as care for the environment, social inclusion and stakeholder engagement [3]. Consequently, research on corporate managers' incentives for engaging in sustainable environmental and social initiatives is imperative [62, 92] because the benefits for large firms to link their governance to sustainable social and environmental performance would be highlighted.

Theoretically, the underpinning concerns may inspire SSA firms' governance toward voluntarily committing to environmental and socially responsive actions in

order to gain a competitive advantage such as accessing crucial resources [62] and obtaining the approval of the wider community (Ntim, [110]). For instance, agency and stakeholder theories advocate that obtaining corporate reputation and competitive advantage requires the adoption of good corporate governance structures, including but not limited to having large, diverse and independent boards, as well as regular meetings and a commensurate number of committees that can enhance board decision-making process [7]. Consequently, our study seeks to investigate the influence of board mechanisms on the sustainability performance of a sample of sub-Saharan African firms from non-financial sectors. The purpose is to analyse specific corporate board mechanisms (board size, board independence, board gender, board educational background, board tenure, foreign directors on board, board leadership–CEO duality, board sub-committees, frequency of board meetings and CEO Power) on the sustainability performance of the companies scattered across five countries (Ghana, South Africa, Botswana, Nigeria and Kenya) in Sub-Saharan Africa. Specifically, the objective of the study is to examine the effect of these board mechanisms on economic, social and environmental performance individually, as well as the combined sustainability performance of non-financial listed firms in the SSA region.

This study's contributions are premised on both agency and stakeholder theorisation. Precisely, agency theory suggests that good governance structures, comprising larger board size, independent, heterogeneous and non-native diverse boards, frequent meetings, longer board tenure and CEO power can enhance managerial monitoring and subsequently influence managerial decision making particularly regarding sustainability performance [7]. In the same vein, the stakeholder theory predicts that demonstrating accountability through the above board mechanisms, while enhancing commitment to environmental and social practices, can balance the conflicting demand of diverse stakeholders. Therefore, given the obvious limitations of prior sustainability studies, our study attempts to broaden the present knowledge as follows: First, our study advances the present knowledge by providing novel evidence on board mechanisms and sustainability performance in countries characterised by limited sustainability matters and also susceptible to the consequences of global warming, environmental pollution, and high unemployment [34]. Second, this study contributes to the current literature by providing evidence on the board mechanisms variables on sustainability performance. Specifically, our study investigates the influence of varied board mechanism variables that have not extensively been

investigated in prior studies on the implementation of decent sustainability performance practices. Third, unlike prior studies which analysed sustainability performance individually (i.e., environmental, social and economic dimensions) [66, 104], Tjahjadi et al., [140], this study combines all three dimensions to analyse the influence of board mechanisms on the combined sustainability performance. Lastly, our study seeks to improve the generalisability of findings of past SSA countries studies by employing both archival data (for board mechanisms' variables) and a content analysis method to develop a comprehensive sustainability performance measure, covering 85 quantifiable items that are sub-divided into environmental (32), Social (32), and Economic (21) items.

The rest of the paper is organised as follows. "Theoretical literature review" section discusses the theoretical literature review of the study. "Empirical literature review and hypotheses development" section reviews the empirical literature and hypotheses development. Section 4 presents the research design, followed by empirical results and discussions in Section five. Finally, "Summary and conclusion" section concludes the paper with a summary and conclusions.

Theoretical literature review

Agency theory

As stated by Jensen and Meckling [72], in agency theory there exists a conflict of interest between the shareholders (principal) and the management (agent). The agency problem occurs once the principal who has title to the company is separated from the agent who is delegated to manage the company in accordance with the principal's welfare [137, 139]. Certainly, the principal (owners) does not know whether or not the agent (managers) has managed the company on behalf of their interests [13, 31]. Generally, agency theory is concerned with two problems that might arise as a result of the principal-agent relationship namely; (1) the conflict of interests between the principal and agents, and (2) in what way the principal controls what the agent is doing [41].

The agency theory framework of the relationship between the board mechanisms and sustainability performance established by Tjahjadi et al., [140] predicts that good CG (especially board mechanisms) can influence sustainability performance. Prior studies posit that agency theory maintains that active CG enhances corporate boards' ability to tackle emerging challenges and mitigate information asymmetry [58, 104]. For example, maintaining effective and efficient boards (e.g., engaging suitable board side, gender heterogeneity, independence, education, foreign diversity, sufficient committees, meeting frequency, adequate tenure, and CEO leadership) can result

in mitigating the agency problem [44, 72]. This could in turn lead to healthier, transparent, and good-quality management (Maama et al., [94]), and therefore significantly influence sustainability performance. Agency theory, thus accentuates the board mechanisms' implementation of social, environmental, and economic sustainability performance [34] so as to provide benefits to the company. Therefore, drawing from agency theory, we intend to hypothesise that board mechanisms relate to legitimate monitoring and control of management activities which tend to influence the sustainability performance of firms in SSA.

Stakeholder theory

Freeman [47] contends that a stakeholder embodies any group and/or individual who can affect or stands to be affected by the achievement of a firm's objectives. In that regard, the stakeholder theory postulates that companies try to harmonise their activities with stakeholders' expectations [21]. External pressures emanating from a number of stakeholder groups such as customers, media, local communities, investors, business partners, civil society and non-governmental organisations (NGOs) tend to intensify steadily, particularly in relation to social and environmental issues [84].

Pressures from these stakeholders, among others influence corporate managers to disclose more information regarding operational activities Kılıç and Kuzey [78]. The authors conclude that this enables stakeholders to have a key role concerning the social and environmental performance of the companies. In that regard, companies use several means such as annual reports, sustainability reports as well as websites to disclose socially, financially, and environmentally responsible practices to the stakeholders Kılıç & Kuzey, [78]. This is because companies' activities impact the community in terms of their health, peace, as well as their safety [28]. Maama et al., [93] claim that these types of stakeholders are comparatively and legitimately powerful and that they have legal and acceptable claims on the firms. As a result, once these stakeholders exercise their power and legitimacy, they can considerably influence the firms to perform sustainably. In this regard, the stakeholder theory can help address the conflicting interests of several groups of stakeholders, once good CG structures (specifically board mechanisms) are in existence, by upholding a reasonable balance between the financial and non-financial objectives of companies Al-Shaer & Zaman, [12, 60]. Based on this assertion, the companies may adopt decent internal board mechanisms and engage in socially, as well as environmentally responsive activities so as to satisfy the interests of diverse stakeholder groups (Nguyen et al., [106]).

In spite of the importance of stakeholder theory to explain the influence of board mechanisms on firms' sustainability performance, this theory is still not fully explored beyond the shareholders' interests to embrace other external stakeholders, particularly considering its non-financial benefits regarding environmental and social performances [103], Haque & Ntim [61]. For instance, the stakeholder theory is aimed at ensuring that the interests of the stakeholders are aligned with that of the company's shareholders. This viewpoint suggests that the perspectives of other key stakeholders are imperative for the effective management of a company [93]. These perspectives are employed to examine whether the Sub-Saharan African non-financial firms' boards' monitoring actions affect sustainability performance in accordance with the stakeholders' expectations. This is due to the moral claims of the stakeholders in relation to the firms' activities and their direct or indirect impact on sustainable society at large.

Empirical literature review and hypotheses development

Board size and sustainability performance

Both agency theory and stakeholder theory suggest that board size is a vital mechanism to influence board efficiency and effectiveness [91, 140]. From stakeholder theoretical viewpoints, bigger boards are associated with many advantages such as many diverse opinions and varied ideas, skills and knowledge, as well as representation of stakeholders that will help in monitoring and controlling management opportunistic behaviors [25, 130]. On the contrary, agency theory contends that, due to a lack of communication among board members, bigger boards frequently suffer from poor decision-making, and in this manner, board efficiency in monitoring managerial opportunistic behaviours may be impaired [40]. Hence, agency theory envisages that weak board mechanisms are strongly linked to larger boards, and this may adversely influence firms' sustainability performance.

However, despite the agency theory's argument against the bigger board size, an empirical study [66] discovered that too smaller board is associated with a heavy workload for board members. Consequently, this can impact negatively the quality of the board members' supervision and monitoring of managerial opportunistic actions. Moreover, the empirical studies [150], Post et al., [120]) and the results of these studies indicate that firms' sustainability performance is positively and significantly influenced by the board side. Additionally, Chams and García-Blandon [32] document that board size is positively linked to sustainability performance, especially on the environmental dimension [18, 129] and social and

economic dimensions [34]. In effect, the boards should be planned to possess a suitable size to work effectively [91]. In spite of these, there is incomplete evidence regarding the influence of board size on sustainability performance, particularly in the SSA context [162]. This absence of evidence, coupled with aforesaid serves as a motivation for us to investigate the influence of board size on companies' sustainability performance. Therefore, our first hypotheses are that.

H1 Board of directors' size has a positive effect on the sustainability performance of Companies.

H1a Board of directors' size has a positive effect on environmental sustainability performance.

H1b Board of directors' size has a positive influence on social sustainability performance.

H1c Board of directors' size has a positive effect on economic sustainability performance.

Board independence and sustainability performance

The agency theory [91] indicates that independent companies' governing boards are able to control and/or monitor the actions of the agents effectively. Similarly, the robust presence of independent outside directors is able to reduce agency conflicts [38, 99], by intensifying monitoring of managers on their social and environmental strategic policy and investment, which can have a positive effect on firms' sustainability performance. In the same manner, stakeholder theory indicates that an independent board is associated with diversity in skills, expertise, experience and stakeholders Haque, [60], Liao et al., [86], which may address the conflict between the varied stakeholders' group interests and thereby help maintain the balance between the financial and non-financial objectives of companies. Hence, from the stakeholder theory's perspective, independent outside directors are likely to apply greater pressure on the top managers to execute decent sustainability performance strategies so as to demonstrate responsibility to the varied interests within the communities.

The empirical studies [10, 73] indicate that board independence plays a key role in the firm's performance, which signifies greater monitoring of managerial self-centered interests that can lead to enhancing sustainability performance ingenuities. In this regard, independent outside boards are expected to be positively associated with sustainability performance, since outside directors are credibly less subjected as compared to internal ones in terms of pressure from shareholders

and executives [121]. Empirically, previous studies have mostly indicated a positive correlation between board independence and sustainability performance in the context of both developed and emerging economies [45, 66, 73, 124]. However, other studies revealed a negative correlation between board independence and sustainability performance [7, 102]. For example, Alnabsha et al., [11] found that independent outside directors had a negative effect on sustainability (environmental) performance since the independent directors were profoundly appointed based on social networks instead of people's capability. Despite the mixed results from the previous studies, Nguyen [106] suggests that increasing the proportion of independent board members is considered a positive development that may enhance pressure on companies to engage in sustainability-friendly activities. Consequently, the second hypotheses of our study are that

H2 Board independence has a positive effect on sustainability performance.

H2a Board independence has a positive effect on the environmental aspect of SP.

H2b Board independence has a positive effect on the social aspect of SP.

H2c Board independence has a positive effect on the economic aspect of SP.

Board gender heterogeneity and sustainability performance

The composition of corporate boards has been given diverse interpretations which generally relate to the diversity of gender and percentage of the inside as against outside directors. This is extensively perceived as a significant mechanism to impact leadership effectiveness and influence board decisions, particularly the aspect of social and environmental accountabilities (Liao et al., [86]). Agency theory indicates that increasing the proportion of women directors is a vital internal board mechanism that is often linked to the promotion of board effectiveness which controls management opportunistic interests Hillman & Dalziel, [65]. From the stakeholder perspective, Orij [114] argues that females are oriented toward social issues as compared to men. Therefore, more females on the board can drive board members towards developing effective stakeholder management via meeting a broader range of performance outcomes. Although agency and stakeholder theories highlight the need for strong board mechanisms to boost environmental and social

responsibility performance, these theories are weakened in the sense that their focus is based largely on the financial benefits (Nguyen et al., [106]). Nevertheless, firms can improve their image by demonstrating compliance with the norms of the greater community and commitment to good sustainability practices Branco and Rodrigues, [29].

Empirically, a prior study [152] indicates that there is a positive and significant correlation between board gender heterogeneity and sustainability performance. The author posits that this positive correlation reflects social responsiveness as well as environmental issues, which are influenced by the background of female board members' namely (1) education, (2) humanities, and (3) law. Williams [152] further posits that these backgrounds can potentially drive women to be more subtle to humanitarian ingenuities and CSR matters, which in turn can influence sustainability performance positively. Furthermore, prior empirical studies have focused individually on the board gender diversity and its influence on firm social performance [63] and economic and environmental performance [32, 42]. Still, studies investigating whether board gender heterogeneity can influence the combined sustainability performance, to the best of our knowledge are limited. Besides, the majority of board gender heterogeneity studies have been conducted in developed economies Galbreath [49, 90], with the outcomes of these studies being mixed. However, despite the mixed findings, none of these studies specify clearly the minimum and/or maximum number of women directors that a board must keep. Hence, the third hypotheses are that

H3 Higher gender heterogeneity on the board has a negative effect on sustainability performance

H3a Higher gender heterogeneity on the board has a negative effect on environmental sustainability Performance

H3b Higher gender heterogeneity on the board has a negative effect on social sustainability performance

H3c Higher gender heterogeneity on the board has a negative effect on economic sustainability Performance.

Board of directors education background and sustainability performance

Premised on the agency theory perspective, the company leaders are encouraged to implement their vision to ensure survival in the long term [98]. This is because company leaders' background influences the strategies that the companies embark upon to assure

their performance [57]. According to stakeholder theory, board members with requisite knowledge and experience might be well-vested in companies' activities which can be used to advise managers to engage in environmentally and socially friendly activities as a sign of accountability to the stakeholders. The theory suggests that given their diverse educational backgrounds, board members are equipped with a wealth of cognitive and intellectual abilities to support the firms' sustainability performance in accordance with stakeholders' needs [80]. This implies that different and/or diversity of educational backgrounds generally improves the quality of resources which in turn enables leaders to address diverse stakeholders' interests, which subsequently increases social responsibility performance more effectively ([56]; Chang et al., 2015; [112].

For example, empirical studies by Kagzi and Guha [76] and Yang et al., [156] affirm that the board's education has a positive effect on a company's performance. Similarly, boards with a higher educational level, coupled with broader experience have a positive effect on corporate social performance, [35, 98, 135]. A study by Garcia Martin and Herrero [51] equally indicates that the boards' education background significantly and positively influences workable environmental performance. Again, some studies document that the educational background of board members has a positive association with the non-financial performance [64, 119]. Empirically, and to the best of our knowledge, none of the existing sustainability performance studies has investigated the association between board education and the combined sustainability performance in the context of SSA based on the agency and stakeholder lenses. Consequently, our fourth hypotheses are that

H4 Board of directors' education background has a positive influence on sustainability Performance

H4a Board of directors' education background has a positive influence on environmental sustainability Performance

H4b Board of directors' education background has a positive influence on social sustainability Performance

H4c Board of directors' education background has a positive influence on economic sustainability Performance

Board of directors tenure and sustainability performance

Based on the agency and stakeholder theories, one of the company's stabilities emanates from board

tenure because extended board tenure is an indication of shareholders' contentment with the directors' appointments. Theoretically Livnat et al., [89] once board members stay longer on the corporate boards, they are able to use their experience and knowledge acquired from long service to better advise managers, which in turn can impact overall firms' performance. Equally, both agency and stakeholder theories [23, 132] indicate that longer board tenure affords members a better opportunity to monitor managers, as they are less prone to peer pressure as well as less likely to be controlled by management. The authors found that long-tenured board members' services enhance outside directors' ability to monitor management more effectively on fraud prevention, which can pave the way for firms' sustainable performance. Empirically, prior studies [136] demonstrate that by staying longer on the board, members can better control managers' self-interest actions (e.g., excess usage of cash flows) and frequent information sharing that allows them to learn more about the company's operations. Thus, enabling them to understand the firm's unique economic, social and environmental performance outcomes. For instance, Bonini et al., [27] opine that longer-tenured board members can gather and store valuable firm information that can eventually be shared with other independent directors, which eventually can be harnessed to aid the firms' sustainability performance strategies.

In contrast, there is an argument that longer board tenure harms firms' performance. For example, Livnat et al., [89] contend that seasoned members of the board tend to be friendlier with management over time, hence losing their ability to monitor management actions objectively. In that sense, we argue that this can decrease board independence and thereby contributes to lower firms' performance in general. Vafeas [146] further indicates that directors who stay on the board longer are considerably expected to have a fiduciary association with the firm, hence the likelihood that they will be affiliated with managers during their tenure, which can also impair their monitoring ability. Further, empirical studies [46], Niu & Berberich, [109] argue that members of the board are likely to become complacent and stop learning about the firms' operations, particularly those concerning sustainability performance issues. The authors posit that longer-tenured boards are likely to suffer from groupthink, which tends to reduce firm value and subsequently influence firms' overall performance adversely. Similarly, a longer-tenure board is associated with an increase in familiarity between the board and management which turns to undermine board independence [46]. By implication, the firm's sustainability becomes questionable. This serves as our

motivation to carry out this study in the context of SSA which is considered to be susceptible to the harmful effects of global sustainability issues [4, 134]. Therefore, our fifth hypotheses are that

H5 Board members' tenure has a negative effect on sustainability performance.

H5a Board members' tenure has a negative effect on environmental sustainability performance.

H5b Board members' tenure has a negative effect on social sustainability performance.

H5c Board members' tenure has a negative effect on economic sustainability performance

Presence of foreign directors on board and sustainability performance

The nationality of the directors is considered another form of board diversity. Oxelheim and Randøy [115] claim that foreign directors' appointment to corporate boards is in response to the business needs of globalisation. Theoretically, [131] foreign directors can bring to the firm a requisite valuable and/or diverse expertise that may not be possessed by domestic directors due to their diverse backgrounds. Based on the agency viewpoint, foreign board members can provide assurance to foreign minority stockholders that the company is managed in their best interest to guarantee the firm's sustainable performance [115].

Empirically, some studies Giannetti et al., [53]; Zhang et al., [160]) claim that board members with foreign experience, via learning channels, are able to convey knowledge and managerial practices from developed countries to emerging economies like SSA, which in turn can improve the firms' economic, social and environmental (sustainability) performance. Similarly, Iliev and Roth [69] contend that knowledge transferred through foreign directors' experience can play a vital role in enhancing sustainable corporate performance, particularly in countries with weak legal, institutional, and governance environments such as those in the SSA. Further, Onyali and Okafor [113] empirically found a positive effect of foreign directors on the three dimensions of SP of consumer goods among firms listed in Nigeria. Similarly, a study by Lau et al., [82] revealed a positive association between the presence of foreign directors and the social dimension of sustainability. Moreover, Beji et al., [24] argue that the presence of foreign nationals on boards affords new

resources and diverse viewpoints, including access to networks, skills, experiences and political connections. Accordingly, their study revealed a positive association between the presence of foreign directors on boards and environmental performance, while Harjoto and Laksmana [56] showed social performance. In contrast Samara and Yousef [131] argue that foreign directors on corporate boards may be less informed concerning domestic dealings, hence considered less effective. This, therefore, can impair their monitoring skills about managers' opportunistic behaviours that are detrimental to sustainability performance. Despite these mixed findings, and based on Agency and stakeholder theoretical contentions, our sixth hypotheses are that

H6 The presence of foreign directors on the corporate board has a positive effect on sustainability performance.

H6a The presence of foreign directors on the corporate board has a positive effect on environmental sustainability performance.

H6b The presence of foreign directors on the corporate board has a positive effect on social sustainability performance

H6c The presence of foreign directors on the corporate board has a positive effect on economic sustainability performance.

Number of board committee and sustainability performance

Theoretically, the board of directors is considered an important instrument inside the firm for resolving internal agency conflicts [71]. Both agency and stakeholder theories [122] contend that the formation of sub-committees of the board (hereafter referred to as board committees) is necessary to serve as control mechanisms, which can mitigate agency conflicts and asymmetric information. To achieve sustainable performance McColgan, [101], boards are normally subdivided into smaller committees in order to monitor executive management effectively as well as perform other tasks relating to serious agency problems. Empirically, Kolev et al., [79] indicate that board committees are considered specialised sub-groups which are set up to execute several of the board's critical functions namely; (1) engaging external auditors and overseeing financial reporting (Audit committee), (2) setting executive remuneration and/or compensation (Remuneration/compensation committee), and (3) Identifying potential board members and/or hiring and

firing key management personnel, including the CEO (Nominating committee).

It is argued [95] that the formation of various committees can be related to firms' decision-making which can impact firms' sustainability performance positively. Arguably, this is because the board of directors' major decisions basically emanate from board committees. For instance, in 1999 the CEO of Sears Roebuck and Company made a profound statement that corporations are run primarily by their sub-committees. In that sense, the agency theory advocates that the board committees must be independent because of their controlling nature. For example, the agency theory considers the board committees' presence as a mechanism for resolving the agency problem which in turn paves the way for the board to perform sustainably [123]. By implication, the board committees are expected to monitor the board's operations to enable the companies to demonstrate performance in both financial and non-financial dimensions [108, 138]. Despite the majority of the aforesaid discussions from developed countries with little evidence from emerging economies, we are motivated to conduct this study in SSA to extend the existing knowledge to another context as well. Hence, our seventh hypotheses are that

H7 The number of board committees has a positive and significant relationship with the sustainability Performance of SSA firms.

H7a The number of board committees has a positive and significant relationship With the environmental sustainability performance of SSA firms.

H7b The number of board committees has a positive and significant relationship with the social sustainability performance of SSA firms.

H7c The number of board committees has a positive and significant relationship with the economic sustainability performance of SSA firms.

Board leadership/CEO duality and sustainability performance

Considered a board leadership structure, the CEO duality allows for the CEO to function concurrently as the chairperson of the firm's board of directors [157]. Hussain et al., [66] note that CEO duality implies the chief executive officer also occupies the position of the chairperson of the board. Agency theory postulates vigilant monitoring of the agent's decision in order to protect the rights of the agent [72]. However, Rechner

and Dalton [125] argue that CEO duality can lead to weak monitoring. From an agency theory perspective (Lee, [83]), the CEO duality subsequently impedes board members' monitoring. Additionally, based on Stakeholder theoretical contentions [30], the CEO duality hardly benefits all stakeholders because decisions made are likely to touch less with the outside interests of the company. Similarly, as the CEO acts as chairperson of the corporate board, the independence of members can be reduced, which subsequently diminishes the accountability of the firm [102]. In other words [44], the boundary line between management and control appears blurred when the two positions (CEO and board chair) are combined, which can adversely influence firms' sustainable performance.

Empirically, the link between the CEO leadership duality and the SP of companies has revealed mixed findings. For example, a study by Arena et al., [18] discovered a positive correlation between the CEO's dual role and environmental performance. Furthermore, a positive association was reported by Jizi et al., [73] and Mallin et al., [97] between CEO leadership duality and firms' non-financial (sustainability) performance. Supporting the positive association between CEO leadership duality and SP, Bui, Nguyen and Chau [30] posit that allowing the CEO board chair positions to be combined can be associated with the rapidity of decision-making. However, the results of no significant correlation between CEO duality and SP have been recorded by other scholars [58, 102]. It is noted that the insignificant association is in line with both theory and managerial reasoning which suggests that the separation between the two positions is prudent to enable firms to perform sustainably [83, 117]. Despite the mixed findings, and based on the contention of agency theory, we expect a negative correlation between CEO leadership duality and sustainability performance. Therefore, the eighth hypotheses are that

H8 Board leadership in the form of CEO duality negatively influences SP.

H8a Board leadership in the form of CEO duality negatively influences environmental SP

H8b Board leadership in the form of CEO duality negatively influences social SP.

H8c Board leadership in the form of CEO duality negatively influences economic SP.

Frequency of board meetings and sustainability performance

In line with the agency theory framework, board meetings are considered a representation of board assiduousness [66], which assumes that with more regular meetings the board members are able to pay more attention to the needs of other stakeholders. This is because board meetings are usually proxied for a level of the board activity and board meticulousness, which can address several stakeholders' concerns and better-influence firms' sustainable performance [81]. For instance, a frequent meeting of the board symbolises board effectiveness in monitoring since critical issues impacting the firms' operations are usually discussed during board meetings. This, therefore, motivates firms to increase transparency and also facilitates better supervision of firms' activities toward addressing multiple stakeholders' concerns [88], which can better evaluate the firms' many risks, particularly those relating to social and environmental challenges (Nguyen et al., [106]).

The empirical studies to examine the influence of board meeting frequency on firms' sustainability performance are scant, and this serves as motivation for our research to examine this relationship. For example, some studies [73], Adawi & Rwegasira [1] report a positive link between board frequent meetings activity and sustainability performance. Similarly, Hussain et al., [66] found support for an association between board meeting frequency and social bottom sustainability performance, whilst Allegrini and Greco [7] found a positive relationship between the number of board meetings and the firm's non-financial performance. In contrast, Hussain et al., [66] report no association between board meeting frequency and environmental performance among US-based companies. The authors contend that more frequent board meetings signify the incapability of directors which has a tendency to impact negatively on a firm's performance. Similarly, Giannarakis [52] report no association between the number of board meetings and sustainability performance. However, based on the agency and stakeholder theories' predictions, this study regards board meeting frequency as a symbol of board assiduousness and therefore expects a positive association between the frequency of board meetings and sustainability performance. Hence, the ninth hypotheses are that:

H9 The number of board meetings is positively related to the sustainability performance of companies.

H9a The number of board meetings is positively related to the environmental performance of companies.

H9b The number of board meetings is positively related to the social performance of companies.

H9c The number of board meetings is positively related to the economic performance of companies.

CEO power and sustainability performance

Generally, corporate CEOs are considered the most powerful and dominant individuals who are capable of influencing board members' free judgment and decision-making [37]. Arguably, the board can hardly get involved in sustainability strategy without the CEO's support. In their study, Tuwey and Tarus [144] indicate that CEO power (classified as CEO long tenure or CEO ownership) can be linked to firms' sustainable strategy and performance. This is because, as Daily and Johnson [36] put it when the CEO wields significant power, his or her aptitude to effect decision-making becomes more enormous, which can positively impact the firms' sustainability performance. Khan et al., [77] studied the extent to which CEO tenure power affects the corporate social (CS) and environmental performance of non-financial companies. The authors reported a negative effect between CEOs' long-tenure power and sustainability (social and environmental performance). To clarify this further [77], the Social and environmental performance of CEOs rises considerably in the early years of service in comparison to later years. The authors found that the association between CEOs' power and sustainability (social and environmental) performance is more pronounced when CEOs expect longer employment tenure. Furthermore, Khan et al., [77] revealed a negative association between CEO tenure and sustainability performance, which they claim can result from the CEO's career perspectives. This is because, when the CEOs are freshly appointed, they wield less power but they can have longer expected career aspirations as compared to CEOs serving their final terms. From this perspective [54], the CEO power is expected to have a positive relationship with the firm's sustainability performance in all (economic, social, and environmental) dimensions.

In contrast, with a moderate level of CEO power [54], it is likely that the CEO will solicit directors' advice and counsel on matters of strategic decision-making, which can affect the performance of the company, not only financially but in the non-financial (social and environmental) dimensions as well. For example, Walls and Barron's [149] study found that CEO with less and/

or informal power reduce the environmental impact. The authors, however, found that any source of COP power (whether formal or informal) remains a good catalyst to transform stakeholder activism into corporate environmental greening. The mixed findings regarding the CEO power and the firm's sustainability performance nexus offer a great opportunity for making a novel contribution to the existing literature. Hence, our tenth hypotheses are that

H10 CEO Power has a negative effect on sustainability performance.

H10a CEO power has a negative effect on environmental performance.

H10b CEO power has a negative effect on social performance.

H10c CEO power has a negative effect on economic performance.

Research design

Data sources and collection

The study used hand-collected archival data from the annual and sustainability reports of non-financial listed companies from Ghana, South Africa, Botswana, Nigeria and Kenya stock exchanges for the period 2010–2019. The annual reports were gathered from the African Markets' official website as well as the individual companies' official websites and were strictly based on annual reports and/or financial statements available for the time frame of the study. Specifically, a sample of 116 companies was pooled from listed non-financial companies based on the market capitalisations, comprising 23 in Ghana, 27 in South Africa, 19 in Botswana, 24 in Nigeria and 23 in Kenya. The final sample had 1160 firm-year observations. Banks and other financial firms have been excluded from the sample on the basis that they have divergent natures of operations and capital structures and thus, must be studied independently [33].

The samples of the countries were based on the common characteristics of being emerging markets economies that were ranked up by the International Monetary Fund (IMF) in 2019. While, South Africa, being the only African country classified among the BRICS emerging economies in the world during the same year (2019), was also included in the sample. The selection of the time period is appropriate because it seeks to evade any effect of the 2008/ 2009 worldwide financial catastrophe. In effect, the chosen period is appropriate because all countries, especially those in

Africa, were starting to recover from this worldwide financial catastrophe. The year 2020 is also excluded due to the impact of the worldwide pandemic COVID19 on companies’ annual reports. Sub-Saharan Africa is selected as a study area because of the importance the world attaches to the eradication of poverty, environmental protection, and concerns around access to clean water [2], Tilt et al., [142]). These issues are therefore not uncommon in the African Sub-Region with scant research on these sustainability matters.

Measurement of variables

Dependent variable

In line with prior studies [66, 102], sustainability performance is measured using three indicators, economic sustainability, environmental sustainability, and social sustainability. These indicators were gathered from the companies’ annual and sustainability reports comprising environmental, social, and economic performance indicators. The study employed a sustainability index as a proxy for sustainability performance, given the absence of a general theoretical outline concerning what items to select as a requirement for inclusion in the sustainability performance index. Hence, this study used the existing sustainability performance indicators identified in the literature to build the sustainability performance index [11].

The rules applied in building the comprehensive sustainability performance index for this study are outlined as follows: (1) a review of existing literature to identify relevant items specifically applicable to this study (2) items included in the published yearly reports by the sampled firms during the 2010–2019 period, and (3) the GRI-G4 sustainability indicators were also examined to identify items that fall within those normally reported

by the sampled companies. Subsequently, we selected the applicable ones to be included in the sustainability performance index. Finally, this brought about an index, comprising 85 quantifiable items that are sub-divided into environmental (32), Social (32), and Economic (21) items. The technique for this indicator index was adapted from the works of previous authors (See [11, 111, 140, 159]). Then, we employed the sustainability performance index to measure our dependent variable (sustainability performance). Using the binary approach, this measure allocates a value of 1 for each item revealed in the annual and sustainability reports and if the item is not revealed, 0 is allocated. This measurement is in line with the previous authors’ approach [59, 159], as specified below.

$$SPIDZ = \frac{\sum XIZ}{NZ} \tag{1}$$

where SPIDZ, Sustainability Performance Index for Z Company; NZ, Total items on Z company, ≤ 85; XIZ, Total items for sustainability index (1 if disclosed and 0 if not disclosed).

Hence,
 $0 \leq SPIDZ \leq 1.$

Independent variables

This study’s aim is to investigate the influence of board mechanisms on SP. Thus, various measures of corporate board mechanisms are employed as independent variables which comprise board size, board independence, board gender heterogeneity, board of directors’ educational background, board tenure and foreign directors on the board. Others include board leadership/CEO duality, number of board committees, frequency of board meetings and CEO power. Table 1 shows the detailed measures of the independent variables.

Table 1 Measurements of independent variables

Name of Variable	Mnemonics	Measurement
Board Size	BSZ	Number of Board Members of the firm
Board Independence	BID	Number of Independent Directors of the firm
Board Gender Heterogeneity	BGH	A binary that equals one if a female member is present on the board
Board Educational Background	BEGS	Directors’ Educational Background scoring
Tenure	TEN	Number of years since being appointed director
Foreign Director(s)	FRD	A binary that equals one if there is a non-native citizen as a director
Board Leadership (CEO) Duality	BLDU	A binary that equals one if the CEO is also the chairman of the board
Board committees	BCMT	Number of board sub-committees
Frequency of Board	FBM	Number of Board meetings per year
CEO Power	CEOP	Maximum number of years CEO could sit on the Board

BEGS Score: Bachelor/Professional + 2 × Master + 2 × MBA + 3 × Ph.D., where Bachelor/Professional, Master, MBA, Ph.D. are dummy variables taking the value 1 if the member possesses this qualification, and 0 otherwise [116]

Control variables

The existing literature has revealed several variables that are recognised to be associated with sustainability performance. Thus, in order to control for these items' influences on the outcome variables, we employed several control variables. For example, every corporation's size generally can affect its decisions. Therefore, firm size is measured by the logarithm of the year-end book values of the company's total assets ([26, 85], Peng, [118]). Prior studies document that companies' age harm economic and social performance [22, 85]. Hence, the age of the firm is measured in accordance with the natural logarithm of the number of years since the firm was established. Leverage is measured as the ratio of total debt to total assets [85]. Also, liquidity was measured as total current assets divided by total current liabilities [66]. Industry effect is controlled using a dummy, 1 for a manufacturing company and 0 for a service company. This is because, different industries might behave differently on sustainability issues [161]. Lastly, the study uses GDP per capita income to control for cross-country effects on board mechanisms and sustainability performance relationships of sample countries.

Empirical model and estimation technique

This study is aimed at testing the association between board mechanisms and the sustainability performance of Sub-Saharan African companies over a 10-year period. Accordingly, a regression model appropriate for panel data is applied to estimate the applicable equation. Specifically, the Generalised Method of Moments (GMM) estimation technique is employed to capture the cause-and-effect relationships in dealing with the underlying phenomenon. The GMM model is generally used for panel data, as it provides consistent results in the presence of diverse sources of endogeneity, specifically identified as (1) unobserved heterogeneity, (2) simultaneity, and (3) dynamic endogeneity [154]. The study adopts the two-step system GMM approach in line with Arellano and Bover's [17] recommendation, so as to avoid potential data loss associated with the first-step GMM due to the internal (first-differencing) transformation problem where the variable's past value is deducted from its current value. Similarly, this methodology can suppress the unobservable heterogeneity that by the nature of the problems can provoke biased results (Neves et al., [105]).

Equally, as this study uses a balanced panel dataset, the choice of the two-step system GMM model would provide more efficient and consistent estimates for the involved coefficients [17, 145]. Highlighting the two-step system GMM model's effectiveness, Roodman [126]

explains that the model applies 'forward orthogonal deviation by subtracting the average of all available observations of a particular variable, instead of just subtracting the variable's previous observation from its current value (in the case of one-step GMM). The general panel equation to be estimated is specified as follows:

$$SPID_{it} = \alpha + \beta_1 SPi(t-1) + \beta_2 CGHit + \beta_3 \times nit + \mu_{it} + \varepsilon_{it} \quad (2)$$

where, SPID denotes sustainability performance index, SPID_{*t*-1} indicates a one period lag operator (that is, a prior year performance); CG_{*t*} indicates corporate board variables, X_{*t*} signifies control variables over the time period, μ_{it} indexes firm specific effects, and ε_{it} signifies the error term. Specifically, the proposed models take the following forms:

$$\begin{aligned} CSPID_{it} = & \beta_0 + \beta_1 CSDI_{it(t-1)} + \beta_2 BSZ_{it} + \beta_3 BID_{it} \\ & + \beta_4 BGH_{it} + \beta_5 BEGS_{it} + \beta_6 TEN_{it} + \beta_7 FRD_{it} \\ & + \beta_8 BLDU_{it} + \beta_9 BCMT_{it} + \beta_{10} FBM_{it} \\ & + \beta_{11} CEOP + \beta_{12} TA_{it} + \beta_{13} LEV_{it} + \beta_{14} LIQ_{it} \\ & + \beta_{15} FAGE_{it} + \beta_{16} IND_{it} + \beta_{17} GDPPCI + \varepsilon_{it} \end{aligned} \quad (3)$$

$$\begin{aligned} EVSPID_{it} = & \beta_0 + \beta_1 EVSDI_{it(t-1)} + \beta_2 BSZ_{it} \\ & + \beta_3 BID_{it} + \beta_4 BGH_{it} + \beta_5 BEGS_{it} \\ & + \beta_6 TEN_{it} + \beta_7 FRD_{it} + \beta_8 BLDU_{it} \\ & + \beta_9 BCMT_{it} + \beta_{10} FBM_{it} + \beta_{11} CEOP_{it} \\ & + \beta_{12} TA_{it} + \beta_{13} LEV_{it} + \beta_{14} LIQ_{it} \\ & + \beta_{15} FAGE_{it} + \beta_{16} IND_{it} \\ & + \beta_{17} GDPPCI + \varepsilon_{it} \end{aligned} \quad (4)$$

$$\begin{aligned} SOSPID_{it} = & \beta_0 + \beta_1 SOSDI_{it(t-1)} + \beta_2 BSZ_{it} \\ & + \beta_3 BID_{it} + \beta_4 BGH_{it} + \beta_5 BEGS_{it} \\ & + \beta_6 TEN_{it} + \beta_7 FRD_{it} + \beta_8 BLDU_{it} \\ & + \beta_9 BCMT_{it} + \beta_{10} FBM_{it} + \beta_{11} CEOP_{it} \\ & + \beta_{12} TA_{it} + \beta_{13} LEV_{it} + \beta_{14} LIQ_{it} \\ & + \beta_{15} FAGE_{it} + \beta_{16} IND_{it} \\ & + \beta_{17} GDPPCI + \varepsilon_{it} \end{aligned} \quad (5)$$

$$\begin{aligned} ECSPID_{it} = & \beta_0 + \beta_1 ECSDI_{it(t-1)} + \beta_2 BSZ_{it} \\ & + \beta_3 BID_{it} + \beta_4 BGH_{it} + \beta_5 BEGS_{it} \\ & + \beta_6 TEN_{it} + \beta_7 FRD_{it} + \beta_8 BLDU_{it} \\ & + \beta_9 BCMT_{it} + \beta_{10} FBM_{it} + \beta_{11} CEOP_{it} \\ & + \beta_{12} TA_{it} + \beta_{13} LEV_{it} + \beta_{14} LIQ_{it} \\ & + \beta_{15} FAGE_{it} + \beta_{16} IND_{it} \\ & + \beta_{17} GDPPCI + \varepsilon_{it} \end{aligned} \quad (6)$$

Note

Dependent variable (CSPID) measures the combined sustainability performance which reflects alternatively the three sustainability dimensions, specifically given as environmental (EVSPID), social (SOSPID) and economic (ECSPID), sustainability performance. The Mnemonics for board variables are detailed in Table 1. The study's control measures are represented as firm size, proxied as total assets (TA), leverage (LEV), liquidity (LIQ), firm age (FAGE) and GDP per Capita Income (GDPPCI). These are cautiously gathered based on the review of prior literature. As a country level variable, the GDP per capita income is employed to control for cross country effect due to the nature of the study' dataset.

Empirical results and discussions

Descriptive statistics

Table 2 presents a summary report of the statistics for the dependent and independent variables considered in the model. The average CSPID of listed companies score is 0.5897 percent with minimum 20 percent and Maximum 91.77 percent. This is an indication that most of the listed non-financial companies report on their sustainability performance. The mean combined sustainability performance index (CSPID) is 58.97 percent. The average value of CSPID in this study is greater than those reported by some authors in other developing economies [159], Zahid et al., [158]), as they reported the average CSPID of 48 percent and 20.16 percent for Palestine and Malaysia firms respectively.

Table 2 Descriptive statistics

VARIABLE	OBS	Mean	STD.Deviation	Minimum	Maximum
CSPID	1160	0.5897	0.1447	0.2000	0.9177
EVSPID	1160	0.6369	0.1912	0.1250	1.1250
SOSPID	1160	0.6344	0.1469	0.1563	0.9688
ECSPID	1160	0.6542	0.1062	0.3333	0.9524
BSIZ	1160	8.9000	2.3674	3.0000	16.0000
BID	1160	6.5428	2.2423	1.9800	14.0800
BGH	1160	0.8030	0.3980	0.0000	1.0000
BEGS	1160	2.6621	0.6921	2.0000	5.0000
TEN	1160	5.7771	2.3974	0.6000	13.4000
FRD	1160	0.8455	0.3618	0.0000	1.0000
BCMT	1160	3.0653	1.4229	0.0000	8.0000
BLDU	1160	0.0258	0.1585	0.0000	1.0000
FBM	1160	4.8439	1.6867	1.0000	20.0000
CEOP	1160	5.9439	7.3641	1.1000	8.98000
TA	1160	6,340,000	2,330,000	1,673,000	32,000,000
LEV	1160	0.5105	0.2424	0.0047	1.5491
LIQ	1160	1.7340	1.8681	-0.9431	18.6479
FAGE	1160	48.2121	29.1540	19.0000	132.0000
GDPPCI	1160	4159.0110	2895.9780	951.69	8097.6500

Considering the three sustainability dimensions individually, it is equally notable that there is a substantial variation in environmental sustainability, social sustainability and economic sustainability levels across the selected companies, thus minimum 12.50 percent, 15.65 percent, 33.33 percent and maximum 112.5 percent, 96.88 percent, 95.24 percent respectively. Indicating that, some companies are unwilling to disseminate a perfect view of some specific dimensions of their sustainability facts to the public.

The mean value of environmental, social and economic dimensions, EVSPID (63.69 percent), SOSDI (63.44 percent) and ECSPID (65.42 percent) are all above their respective standard deviations, indicating that the data is clustered about the mean. Concerning the independent variables, the average board size (BSIZ) is approximately nine (9) (minimum 3 and maximum 16) members. Similarly, seven (7) board members represent outside independent directors (BID) of the selected companies.

Approximately 80 percent of the companies have at least one woman (BGH), who serve on their boards. The mean board education (BEGS) is 2.6621, indicating that board members on the selected firms can be identified with three (3) separate levels of qualifications. The mean years of board members (TEN) is approximately 5.8 years. The mean value of foreign directors (FRD) on the selected companies board is 84.55 percent. This signifies that majority of companies in Sub-Saharan Africa have foreign nationals in their board rooms, which is higher than 12 percent reported by Zaid et al., [159] for Malaysia companies. The mean number of board committee (BCMT) is three (3) (minimum 0 and Maximum 8) board-subcommittees.

The mean value of board leadership/CEO duality (BLDU) is 0.0258, indicating that 2.58 percent of the companies' CEOs serve likewise as chair persons of the boards. This is lower than the 36 percent reported by Alnabsha et al., [11] of Libyan listed firms. The mean number of board meetings (FBM) is approximately 4.8 times, implying that close to five times within the year the board of Sub-Saharan Africa firms meet to discuss issues on sustainability performance. Finally, the average level of long tenure CEO power (CEOP) is approximately 5.9 years (Minimum 1.1 and Maximum 8.9), indicating that CEOs on companies' boards in Africa wields moderate power to influence sustainability performance.

Spearman correlation

Table 3 displays the spearman correlation analysis among the study's variables. Most of the correlations are below 0.50. Only the correlation (0.6188) between board independence (BID) and board size (BSZ) is greater than 0.50. Nonetheless, it is within the minimum correlation coefficient threshold of the 0.7 suggested by Schober and Vetter

Table 3 Spearman correlation matrix analysis

	EVSPID	SOSPID	ECSPID	CSPID	BSIZ	BID	BGH	BEGS	TEN	FRD	BCMT	BLD	FBM	CEOP
EVSPID	1.0000													
SOSPID	0.0617***	1.0000												
ECSPID	0.0676***	0.0381***	1.0000											
CSPID	0.0938***	0.1853***	0.0783***	1.0000										
BSIZ	0.2567***	0.2661***	0.0871**	0.0681***	1.0000									
BID	0.2213***	0.1508***	0.0213	0.1787***	0.6188***	1.0000								
BGH	0.1185***	0.2248***	0.0379	0.1553***	0.3152***	0.2545***	1.0000							
BEGS	0.1087***	-0.116**	-0.0755	0.0045**	0.1418***	0.0881**	0.1278	1.0000						
TEN	0.1189***	0.1298***	0.1915***	0.1789***	0.1015***	0.0576	0.0421	0.0009	1.0000					
FRD	0.1938***	0.2155***	0.1583***	0.2158***	0.0741**	-0.0389	0.0303	0.0110	-0.0550	1.0000				
BCMT	0.3818***	0.3760***	0.1545***	0.3944***	0.4755***	0.4476***	0.2013***	-0.0199	-0.0151	0.1291**	1.0000			
BLDU	-0.0278	-0.0717*	-0.1117***	-0.0653*	-0.0650*	-0.225***	0.0566	0.0266	0.0952**	0.0696*	-0.1712	1.0000		
FBM	0.2123***	0.1289***	0.1201***	0.2028***	0.1569***	0.1880***	-0.0303	0.2123***	0.0701*	0.0537	0.2726***	-0.0899	1.0000	
CEOP	0.1008***	0.0368	0.0902**	0.0947**	0.0706*	0.0247	-0.0469	-0.0720*	0.3300***	0.0280	-0.0292	0.0294	0.0384	1.0000
TA	-0.2146***	-0.1274***	-0.0317	-0.1847***	-0.1345***	-0.1423**	0.0482	-0.1154	0.0031	-0.1561***	-0.1894***	0.1187***	-0.2143**	-0.1063***
LEV	-0.0247	0.0427	-0.0907***	0.0027	0.1820***	0.0725*	0.1290***	-0.0170	-0.1566***	0.0037	0.3254***	0.1819***	-0.0429	-0.0531
LIQ	0.1037***	0.0781**	0.1007***	0.0935**	-0.1235***	-0.1112***	-0.0839**	0.0024	0.2239***	0.0744**	-0.0846***	-0.0964**	0.0537	0.0472
FAGE	0.2568***	0.1779**	0.0540	0.2187***	0.0294	0.0752**	0.1785***	-0.0860**	0.0078	0.2187***	0.1775***	-0.0632	-0.018	-0.0913**
GDPPCI	0.1759***	0.0230	0.0831**	0.1165***	0.2623***	0.1430***	0.0793**	0.3045***	0.2045***	0.0284	0.1114***	0.0766**	0.1939***	0.1540***
TA		LEV	LIQ	FAGE	GDPPCI									
TA	1.0000													
LEV	0.1862***	1.0000												
LIQ	-0.1015***	-0.464***	1.0000											
FAGE	-0.2970***	0.0285	0.0866***	1.0000										
GDPPCI	-0.0899**	-0.1560***	0.1628***	-0.1789***	1.0000									

***, ***, * are statistical significance at the 1%, 5% and 10% levels respectively.

Table 4 Multicollinearity test

Variable	VIF	1/VIF
BSIZ	4.88	0.204939
BID	4.41	0.226762
BCMT	1.82	0.5499
GDPPCI	1.46	0.682641
LEV	1.42	0.706546
BLDU	1.23	0.814467
FAGE	1.22	0.820313
FBM	1.21	0.825085
TEN	1.18	0.848731
BGH	1.15	0.866157
BEGS	1.15	0.871281
FRD	1.14	0.874510
CEOP	1.12	0.891572
TA	1.12	0.894307
Mean VIF	1.75	

[133]. This implies that there is no serious multicollinearity problem exist between the independent variables.

Variance inflation factor (VIF) analysis

Table 4 shows that the mean VIF score for all the main variables used in the study is 1.75. This suggests that the problem of multicollinearity does not exist among the explanatory variables in this study, since VIF score is far below 5 [20]. Besides, the VIF values range from 1.12 to a maximum of 4.88. Thus, contradicting the rule of thumb [55] that the VIF > 10 threshold symbolises serious collinearity.

Multiple regression analysis

To investigate the association between board mechanisms and sustainability performance, our study employed multiple regression models to demonstrate the precise associations. One of the major issues regarding the argument on the association between corporate governance characteristics and firm sustainability performance is that of endogeneity. The issue of concern arises since a firm's current /past performance might affect the future/current governance of the firm's structure. To address this issue, the two-step system Generalized Method of Moments (GMM), considered

Table 5 Board mechanisms and combined sustainability and environmental, social and economic sustainability performance

VARIABLE	Mod.1 (CSPID)	Mod.2 (EVSPID)	Mod.3(SOSPID)	Mod.4 (ECSPID)
L1.CSPID	1.02920***			
L1.EVSPID		0.83110***		
L1.SOSPID			0.89896***	
L1.ECSPID				0.72150***
BSIZ	-0.00117**	0.05395**	0.01049***	0.00944
BID	0.00463*	-0.00403	-0.01119	-0.00136
BGH	-0.00309	-0.01443	0.00638	0.00650
BEGS	0.00350*	0.01947	-0.01072***	-0.00730**
TEN	0.00278	0.00314**	0.00308	0.01410*
FRD	-0.00448	0.01500	0.00629	0.01357
BCMT	-0.00256	0.02901	0.01802*	0.02464***
BLDU	0.04317***	0.05548***	0.02615	0.00966
FBM	0.01219***	0.01304**	0.01751*	0.00987
CEOP	-0.00179	-0.00053	-0.00070	-0.00044
TA	0.00278***	0.00129	0.00255***	0.00140
LEV	-0.00287	-0.01684**	-0.00250	-0.00531
LIQ	0.004030	0.00756**	0.00460	0.00710*
FAGE	0.00150	0.00440	-0.00197	-0.00825
GDPPCI	-0.01774***	-0.0135***	-0.01987***	-0.01355***
NO. of Obs	1160	1160	1160	1160
Wald Chi2	98,811.50	23,868.27	41,013.71	28,210.96
Prob > Chi2	0.000	0.000	0.000	0.000
Groups/Instruments	116/47	116/47	116/47	116/47
AR (2)	0.224	0.174	0.419	0.433
Hansen Statistics	0.251	0.232	0.726	0.728

***, **, * are statistical significance at the 1%, 5% and 10% levels respectively. Probability values for AR (2) and Hansen statistics are reported

to be more robust in dealing with this source of endogeneity, has been applied.

The two-step system GMM methodology used is in line with the Arellano and Bover [17] and Roodman [126] estimation model, which is aimed at (1) eliminating endogeneity problems (2) removing the time-invariant fixed effects that affect the outcome (dependent) variable, and (3) to avoid potential data loss associated with the use of one-step system GMM approach.

To begin with, the study employed a number of diagnostic tests for the dynamic system panel data GMM with level equations to guarantee that an appropriate econometric model is applied. First, the 1-year lagged dependent variable was used in the models. Further, the Arellano–Bond test for the hypothesis that there is no serial correlation (autocorrelation) in the first-differenced residuals, AR (1) and AR (2) was performed. Table 5 shows that the p -values for the AR (2) tests are above significant level ($PV > 0.05$), indicating that they are all statistically insignificant. These suggest that the null hypothesis (no serial correlation in the models) cannot be rejected. Consequently, based on the aforesaid diagnostic tests, the GMM models shown in Table 5 are well-specified.

Additionally, the Hansen test was conducted for over-identification for the validity of the full instrument set. Here, the null hypothesis is that the instruments incorporated in the system GMM are strictly exogenous (valid). From Table 5, it is evidenced that p -values of the Hansen statistics tests in all models vary (that is, ranges from 0.232 to 0.728), indicating that the null hypothesis cannot be rejected and that the validity of the instruments used were verified in all models. Table 5 further portrays empirical outcomes of the two-step system GMM. The p -values of Chi2 test which ranges from 23,868.27 to 98,811.50 for all models are less than 1 percent (0.000%) level of significance. Therefore, all explanatory (independent) variables in the study's empirical models have a joint influence on the dependent variable.

The influence of board mechanisms on combined sustainability performance

Table 5 (Model 1) presents the results of the hypothesis testing regarding the influence of CG mechanisms on combined sustainability performance (CSP). The results (**H1**) indicate that board size (BSIZ) has a negative and significant coefficient (-0.00117). This clearly indicates that firms with a 1 percent increase in board size also have a 0.00117% decline in overall sustainability performance, *ceteris paribus*. Contrary to the expected positive coefficient sign, hypothesis one (**H1**) is not supported regardless of the significant p -value (0.05%) resulted.

Further, the findings show that board independence (BID) is positive and significantly related (coefficient 0.00463) to overall SP. This obviously suggests that as the firm's independent board membership increases by 1 percent, it will cause a 0.00464 percentage increase in overall SP. Similarly, board members' educational background (BEGS) has a significant positive (coefficient 0.00350) relationship with combined SP. This suggests that a 1 percent increase in board members' level of education causes a 0.00350 percentage increase in the combined SP of firms. These results indicate that both **hypothesis 2 and Hypothesis 4** cannot be rejected in terms of board independence and board level of education, respectively.

Furthermore, board leadership in the form of CEO duality (BLDU) has a statistically significant and positive (coefficient 0.04317) association with overall SP. The coefficient sign predicted was **negative** which is contrary to the resulted one, hence **hypothesis 8** cannot be supported regardless of the statistically significant p -value (1%) recorded. Also, the frequency of board meetings (FBM) has a positive and statistically significant coefficient (0.01219) correlation with combined (CSP). This obviously suggests that an increase in board meetings by 1 percent will cause a 0.01219 percentage increase in overall sustainability performance. Therefore, **hypothesis 9** is supported. Finally, the firm size (TA) used as a control variable indicated a positive and significant p -value (1%) correlation with CSP, indicating that an increase in firm size by 1percent results in 0.00278 percentage increase in combined sustainability performance. Again, gross domestic product per capita income (GDPPCI) revealed a negative and significant p -value (1%) correlation with CSP, implying an increase in GDPPCI by 1 percent will cause the combined sustainability performance to decrease by 0.01774 percent.

The influence of board mechanisms on environmental sustainability performance

Table 5 (Model 2) Presents the results of the hypothesis testing concerning the effect of CG mechanisms on the environmental dimension of sustainability performance. In respect of board size (BSIZ), the findings show a positive coefficient, as predicted (**H1a**), and statistically significant at a 5 percent (0.05%) level of significance. Hence, **hypothesis 1a** is supported. This implies that all things being equal, a 1 percent increase in board size will cause a 0.05395 percentage increase in environmental sustainability performance among the non-financial firms in Sub-Saharan Africa.

Equally, the results exhibit that the board members' tenure (TEN) has a positive and statistically significant (coefficient 0.00314) association with environmental

sustainability performance. This outcome suggests that a 1 percent increase in board members' tenure will bring about a 0.00314 percent increase in environmental sustainability performance and vice versa. Based on this finding, hypothesis **5a** is not supported.

Also, **H8a** predicted that board leadership in the form of CEO duality negatively influences environmental sustainability performance. On the contrary, it can be seen from Table 5 that the coefficient (0.05548) of board leadership in the form of CEO duality (BLDU) has a positive and statistically significant (1%) association with the environmental dimension of sustainability. The results regarding the frequency of board meetings (FBM) show a positive and statistically significant association with environmental performance, as predicted by **H9a**. This suggests that a 1 percent rise in board meetings causes a 0.01304 percentage rise in environmental sustainability performance and vice versa. Therefore, **hypothesis 9a** is supported. Finally, the result regarding the liquidity (LIQ) as a control variable reveals a positive and statistically significant (p -value 0.05%) relationship with EVSP, indicating that an increase in firm's liquidity causes a 0.00756% increase in environmental performance and vice versa.

The influence of board mechanisms on social sustainability performance

Table 5 (Model 3) presents the results of the examined effect of the relationship between the corporate boards' characteristics and the social dimension of sustainability performance. The findings disclose that the board size (BSIZ) has a positive and statistically significant (coefficient 0.01049) correlation with social sustainability performance. The finding indicates that a 1 percent rise in board size causes a 0.01049 percentage rise in social sustainability performance. Accordingly, hypothesis **1b** cannot be rejected.

Furthermore, the board of directors' educational background (BEGS) has a negative and statistically significant (coefficient -0.01072) association with social sustainability performance. This suggests that a 1 percent increase in board members' education brings about a 0.01072 percent decrease in the social performance of firms. Although statistically significant (less than 1%), this result led to the rejection of hypothesis **4b** based on the sign. Also, the results show that the number of board committees (BCMT) recorded a positive and statistically significant (coefficient 0.01802) correlation with social performance. This suggests that a 1 percent increase in the number of board sub-committees reflects a 0.01802 percentage increase in social performance. Hence, **hypothesis 7b** is supported. The results for the board of directors' frequent meetings (LNFBM) reveal a

positive and statistically significant (coefficient 0.01751) association with social performance. This indicates that a 1 percent rise in board meetings will result in a 0.01751 percentage rise in social sustainability performance and vice versa. Therefore, hypothesis **9b** cannot be rejected.

The influence of board mechanisms on economic sustainability performance

Table 5 (Model 4) presents the findings of the examined relationship between CG mechanisms and the economic dimension of sustainability performance. The findings reveal that the board of directors' educational background (BEGS) has a negative and statistically significant (coefficient -0.00730) relationship with economic sustainability performance. This implies that a 1 percent increase in board members' level of education brings about a 0.00730 percentage decrease in firms' economic performance. While the study predicted a **positive (+)** sign, the resulted sign of the coefficient implies hypothesis **4c** is not supported. Also, the board members' tenure (TEN) shows a positive and statistically significant (coefficient 0.01410) association with economic performance. This indicates that a 1 percent increase in the board of directors' tenure brings about a 0.01410 percentage increase in economic performance. Contrary to the predicted sign, hypothesis **5c** is not supported. Findings further show that the board's sub-committee (BCMT)) has a positive and significant (coefficient 0.02464) relationship with economic sustainability performance. This implies that when the number of board sub-committee is increased by 1 percent, it will result in a 0.02464 percent increase in economic sustainability performance. Based on this finding, **hypothesis 7c** is supported.

Discussions

The board mechanisms and combined sustainability performance

The study discovers that board independence, board educational background, CEO duality leadership, and frequency of board members' meetings are all significant and positively related to the combined SP. The positive influence of BID on CSP supports theoretical contentions that independent directors possess a responsibility for a broader variety of stakeholders which allows them to put more pressure on reporting firms' sustainability performance ([50, 74] and is also in line with prior studies [45, 66, 73]. Further, the positive association between BEGS and CSP is also in line with prior studies [76, 135] and theoretical contentions that board members' educational background influences the strategies that the companies embark upon to assure their performance [57]. The result indicates that the board of directors in

SSA possesses a blend of educational backgrounds to influence sustainability performance [35]. Similarly, the positive influence of CEO leadership duality on CSP is not supported by prior studies [30, 52] and is not in line with theoretical predictions of the CEO's role separation from the board chairperson to ensure effective monitoring [7, 66]. Our finding indicates that the leadership roles of majority CEOs in SSA are not separated from chairpersons, indicating weak monitoring of SSA firms' managerial decisions.

Again, the positive influence of board meetings frequency on CSP is also in line with prior studies [7] and theoretical contentions that the boards frequent meeting is an indication of board diligence on sustainable performance outcomes [66]. This result shows that the board of directors in SSA has a concern for not just financial accountability but also non-financial (sustainability) performance. In contrast, our findings in (Model 1) indicate that the board gender, board tenure, foreign directors, board committees and CEO power have no influence on CSP. These findings in the context of the SSA region indicate that the issues of sustainability and firms' internal governance mechanisms are comparatively new, which justifies our motivation for this study. Finally, the positive and significant association between firm size and the overall sustainability performance is an indication that firms with larger sizes demonstrate sustainability performance which corroborate Hussain et al., [66] findings. In contrast, the negative effect of GDPPCI on CSP is an indication that firms' overall sustainable performance outcomes may not necessarily reflect the respective countries' income levels.

The board mechanisms and environmental sustainability performance

Our results show that board BSIZ has a positive influence on EVSP. Theoretically, this empirical result is expected [91, 140] and is also in line with prior studies [18], Husted & de Sousa-Filho [68]) that board size has a positive effect on environmental performance. This result indicates that more board members in SSA countries possess diverse ideas and views to create an environmental strategy and also understand environmental issues [34], which tend to impact environmental sustainability performance. Consequently, environmental matters are deliberated because the African continent is plagued with numerous environmental challenges [2, 141]. Similarly, our finding indicates that board members' tenure has a significant positive effect on environmental sustainability performance. This is theoretically expected and is also in line with an empirical study by Livnat et al., [89] who indicate that longer tenure allows members more time

to learn about firms' operations which affords them an opportunity to understand their environments. In sub-Saharan Africa, many other factors can account for the members' longer sitting on corporate boards, such as a lack of befitting replacement due to the absence of experience and/or lack of qualified human resources on corporate issues. It could also be that some board members stay longer on corporate boards because of their political connections and/or societal influences. In all, board members' longer tenure is good for better-advising management on environmental matters in the SSA context [89].

Furthermore, the CEO dual leadership's positive effect on environmental sustainability performance is not supported by theoretical predictions Liao et al., [87] that the governing board ought to monitor the decisions of the agents, which calls for a role separation of the CEO leadership and the chairperson. This finding also is not in line with prior studies [18, 66]. Our result shows that some firms in SSA countries are weakly being monitored, particularly on managerial entrenchment [7] and this ineffective monitoring can make the CEO less concerned about environmental issues compared with role-separated CEOs [83, 117]. Furthermore, board members' frequent meeting has a positive link with environmental sustainability performance. This is in line with theoretical predictions (Adawi & Rwegasira [1], [73], that board frequent meetings are indications of board diligence and also supported by prior studies [7] that frequent meetings of the board members create opportunities for them to share ideas and be more vigilant on stakeholders' environmental concerns. This result portrays evidence that directors of SSA firms turn to focus on discussing sustainability issues at board meetings. Still, the positive influence of the firm's liquidity on the environmental dimension of sustainability performance shows that firms in the SSA sub-region are committed to environmentally sustainable business activities in line with their financial resources.

In contrast, board independence, board gender heterogeneity, board of directors' educational background, foreign directors serving on corporate boards, number of board committees and CEO power have no power to influence environmental sustainability performance. These findings are not in line with theoretical predictions ([38, 99], Hillman and Dalziel [65]) that these board mechanisms promote board effectiveness, which controls management opportunistic interests. These results provide evidence that policymakers for SSA firms should focus on these matters in line with their sustainability performance policies.

The board mechanisms on social sustainability performance

The study has revealed that board size has a significant positive effect on social sustainability performance. This result is consistent with agency theory [43, 73] that companies with larger boards demonstrate better social performance and also in line with empirical findings ([34, 96], Husted & de Sousa-Filho, [68]). This result indicates that social issues are considered an important concern of the board members in the SSA countries [67]. Similarly, the board of directors' educational background has a negative significant effect on social sustainability performance. The result does not match theoretical expectations and is also not in line with empirical findings ([35, 98]). This finding suggests that the higher level of education possessed by board members in SSA firms does not appeal to their conscience toward social issues. Hence, confirms the general assertion that most African corporate leaders are inclined to empire-building to the detriment of the stakeholders' social needs.

Furthermore, the significant positive influence of board committees on social sustainability performance matches with theoretical contentions [123] of monitoring and advisory function of boards subcommittees, and is also in line with some empirical discoveries [9, 79]. Our result provides evidence that in Sub-Saharan Africa, board subcommittees are set up to monitor the board's operations to enable the companies to demonstrate performance not just in financial, but also social dimensions. Also, board meetings and their effect on social sustainability performance revealed in our study are in line with prior studies [7, 66] and is also in line with theoretical predictions Allegrini & Greco [7, 73] that frequency of board meetings provide decent opportunities for board members to share ideas, work assiduously to address diverse stakeholders' social concern. This outcome shows evidence that directors in the SSA region turn to focus on deliberating social issues at board meetings.

The board mechanisms on economic sustainability performance

The outcome of this study indicates that the board of directors' educational background has a significant negative influence on economic sustainability performance. This finding is in line with prior studies [66, 140] but finds no support for theoretical predictions [57] that board members with good educational background are able to understand and support companies' sustainable strategies. For instance, according to the authors, agency theory predicts that board members with requisite knowledge and experience are in a better position to advise managers on economic performance which can enhance shareholder wealth maximisation drive. This finding provides evidence that board

members in the SSA region with specific educational backgrounds are likely to focus only on their expertise to the disadvantage of other important aspects of the company's economic sustainability. This outcome can be attributed to some reasons provided as follows. First, the education of board members that is not in line with the company's business field may cause some potential problems in relation to economic performance. Second, members' educational levels that are not matched with the others may also raise potential problems as regards economic performance.

Similarly, the positive influence of board tenure on economic sustainability performance is in line with theoretical contention [23, 89, 132] that directors who stay longer on the corporate boards are able to use their experience and knowledge acquired from long service to better advise managers on economic performance. Our finding provides evidence, which is in line with agency theory predictions that directors in the SSA company boards have a good opportunity to monitor managers, as they are less likely to be controlled by management. Furthermore, the significant positive influence of board committees on economic sustainability performance is supported by theoretical contentions [123] that subcommittees of the board are created for monitoring and advisory functions. This result is also in line with some empirical findings [9, 79]. Our result provides evidence that board subcommittees are set up to monitor the board's operations to enable the companies to demonstrate improvement in economic performance.

Summary and conclusion

The Sub-Sahara African countries' sustainability issues and problems have been on the rise in recent decades. This has attracted the attention of both environmental and social communities, as well as researchers. Accordingly, most countries in the African sub-region have made some attempts to intensify their campaign for cleaner production and the need for attaining the SDGs which seek to bring an end to poverty and guard the planet, thus assuring prosperity by 2030. Despite the renewed interest, studies examining the influence of board mechanisms on sustainability performance in SSA are limited [16, 140, 144]. As a result, our study seeks to investigate the influence of diverse internal board mechanisms (i.e., BSIZ, BID, BGH, BEGS, TEN, FRD, BLDU, BCMT, FBM and CEOP) This study, therefore, contributes to the current literature on board governance and sustainable environment in emerging countries as follows:

First, our study contributes to the present knowledge by providing novel evidence on board mechanisms and sustainability performance in countries characterised

by limited sustainability matters and also susceptible to the consequences of global warming, environmental pollution, and high unemployment [34]. Second, this study contributes to the current literature by providing evidence on the board mechanisms variables on sustainability performance. Specifically, our study investigates the influence of varied board mechanism variables that have not extensively been investigated in prior studies on the implementation of decent sustainability performance practices. Third, unlike prior studies which analysed sustainability performance individually (i.e., environmental, social and economic dimensions) [66, 104], Tjahjadi et al., 140), this study combines all three dimensions to analyse the influence of board mechanisms on the combined sustainability performance. Lastly, our study seeks to improve the generalisability of findings of past SSA countries studies by employing both archival data (for board mechanisms variables) and a content analysis method to develop a comprehensive sustainability performance measure, covering 85 quantifiable items that are sub-divided into environmental (32), Social (32), and Economic (21) items.

Generally, our results for the board mechanisms affirm that board size, independence, directors' educational background, and frequency of board meetings have a positive influence on combined sustainability performance. Also, board size, board tenure, CEO dual leadership and frequency of board meetings have a positive and significant effect on environmental sustainability performance. Similarly, the board tenure revealed a positive and significant association with economic performance, while the board of directors' educational background shows a negative correlation with both social and economic sustainability performance. Finally, board sub-committees have a positive and significant influence on social and economic performance.

The findings have important implications for regulators and policymakers. For instance, sustainability performance seems to differ among our sampled companies. These results also appear generally low when compared with similar performance reported in other emerging economies. Accordingly, regulators and policymakers, like the SSA stock markets and the various governments, can attempt to offer strong strategic guidelines on how best to report on sustainability performance that can lead to standard sustainability performance indicators. Similarly, despite the SSA firms seeming to comply with internal corporate governance principles, their level of sustainability performance reporting does not seem to be high, demonstrating that firms' internal board mechanisms and practices require further improvement. In this regard, regulators

and policymakers should endeavour to inspire firms to comply completely with governance codes by providing strong guidelines, which should include the creation of compliance and enforcement of board mechanisms functions. This implies that policymakers for SSA firms should attempt to establish a commensurate board size as well as sufficient board meeting frequency, which can enhance board monitoring regarding the attainment of companies' sustainable performance. Furthermore, regulators should offer strong guidelines on how to enhance the capability of directors, particularly women, foreign and independent directors. Finally, the positive outcome of the board tenure implies that regulators should endeavour to promulgate a guideline to support board members' longer staying on corporate boards to gather sufficient experience to be used in advising management on environmental and economic performance issues.

This study met with some limitations that might be overcome with further research. First, we measured board independence and board gender variables, using a binary approach (i.e., 1 or 0). As a result, their outcome lacks generalisability based on their specific measures. Future studies might use alternative measures such as the proportion of independent directors and the proportion of women on the board. Second, this study considered the big firms that have the resources to engage in sustainability practices, which limits the generalisability of the study's results. Future research might, therefore, include small and medium firms to extend the scope of the study as a whole. Third, the control variable of industry effects used in this study was limited to manufacturing and service companies by using a binary with 1 representing the manufacturing company and 0 representing the service company. A future study might consider other measures like industry classifications that can yield different results. Finally, the study employed the general GRI-G4 framework for measuring sustainability performance. These inherently possess some limitations regarding their relevance and/or applicability in some sectors. Therefore, future studies might use a sector-specific framework that can afford a better insight into the corporate governance mechanism and sustainability performance association.

Abbreviations

GMM	Generalised method of moments
SSA	Sub-Saharan Africa
SP	Sustainability performance
CG	Corporate governance
SDGs	Sustainable development goals
GRI	Global reporting initiative
BSIZ	Board size
BID	Board independence

BGH	Board gender heterogeneity
BEGS	Board educational backgrounds
FRD	Foreign directors
BLDU	Board leadership duality
BCMT	Board committees
FBM	Frequency of board meetings
CSP	Combined sustainability performance

Acknowledgements

Not Applicable.

Author contributions

The first draft of the manuscript was written by PK. KOP commented on previous versions of the manuscript. BA also commented on the previous version of the manuscript and did contribute to the literature review section. All authors read and approved the final manuscript.

Funding

The authors did not receive support from any organization for the submitted work.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Not Applicable.

Consent for publication

Not Applicable.

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

Received: 29 May 2023 Accepted: 12 September 2023

Published online: 26 October 2023

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